

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

1-85. (Canceled)

86. (Currently amended) A method of providing therapy to a patient, comprising:  
~~detecting conditions related to sleep, the sleep-related conditions comprising~~  
sensing a condition associated with a sleep-wake status of a patient and a  
~~condition associated with REM sleep, wherein the detecting is performed at~~  
least in part implantably;  
detecting the sleep-wake status based on the sensed condition;  
sensing pectoral muscle tone using a sensor disposed on a cardiac rhythm  
management device implanted in a pectoral region;  
detecting REM sleep status based on the pectoral muscle tone;  
classifying one or more sleep states based on the sleep-wake status and the REM  
sleep status~~detected conditions~~, wherein the classifying is performed at least in  
part implantably; and  
providing sleep state informed therapy using the sleep state classification;  
~~wherein detecting the condition associated with REM sleep comprises sensing a~~  
~~muscle tone in a pectoral region of the patient.~~

87. (Previously presented) The method of claim 86, wherein sensing the muscle tone includes sensing the muscle tone using an electromyogram sensor.

88. (Currently amended) The method of claim 86, wherein sensing the muscle tone includes sensing the muscle tone using a sensor on a header of the cardiac rhythm  
management device~~mechanically coupled to an implantable medical device.~~

89. (Previously presented) The method of claim 86, wherein the sleep state informed therapy comprises a cardiac therapy.

90. (Withdrawn) The method of claim 86, wherein the sleep state informed therapy comprises a preventative therapy.

91. (Previously presented) The method of claim 86, wherein the condition associated with the sleep-wake status of the patient comprises patient activity.

92. (Currently amended) The method of claim 86, wherein ~~detecting~~ sensing the condition ~~conditions related to~~ associated with the sleep-wake status includes detecting patient activity using an accelerometer.

93. (Currently amended) The method of claim 86, wherein ~~detecting~~ sensing the conditions ~~condition related to~~ associated with the sleep-wake status includes detecting body posture.

94. (Canceled)

95. (Previously presented) The method of claim 86, wherein the condition associated with the sleep-wake status includes a patient activity signal, and wherein classifying includes determining sleep onset by comparing the patient activity signal to a sleep threshold.

96. (Previously presented) The method of claim 95, wherein classifying also includes determining sleep offset by comparing the patient activity signal to the sleep threshold.

97. (Currently amended) The method of claim 86, wherein ~~the condition associated with REM sleep includes an REM-modulated signal, and wherein~~ classifying includes determining REM sleep onset by comparing the ~~REM-modulated signal~~ pectoral muscle tone to an REM sleep threshold.

98. (Currently amended) The method of claim 97, wherein classifying also includes determining REM sleep offset by comparing the pectoral muscle tone ~~REM-modulated signal~~ to the REM sleep threshold.
99. (Previously presented) The method of claim 86, further comprising:  
detecting a cardiac signal;  
wherein the sleep state informed therapy includes bradycardia pacing therapy responsive to the detected cardiac signal and adapted to switch to a lower pacing rate based on the sleep state classification.
100. (Withdrawn) The method of claim 86, further comprising:  
detecting a cardiac signal;  
wherein the sleep state informed therapy includes preventative arrhythmia therapy responsive to the detected cardiac signal and to the sleep state classification.
101. (Previously presented) The method of claim 86, further comprising:  
detecting a cardiac signal;  
analyzing the cardiac signal on a beat-to-beat basis;  
wherein the sleep state informed therapy is responsive to the beat-to-beat cardiac signal analysis.
102. (Previously presented) The method of claim 86, further comprising:  
detecting a tidal volume of the patient's respiration; and  
declaring a hypopnea event if the tidal volume falls below a hypopnea threshold.
103. (Previously presented) The method of claim 102, further comprising:  
declaring an apnea event if the tidal volume falls below an apnea threshold lower than the hypopnea threshold.

104. (Currently amended) An implantable ~~medical~~cardiac rhythm management device suitable for implantation into a patient, the device comprising:

a detector system comprising a first and second sensor,

the first sensor disposed on the implantable cardiac rhythm management device,  
the first sensor configured to detect a first condition sense muscle tone in a  
pectoral region of the patient and to detect associated with REM sleep status  
based on the pectoral muscle tone~~and suitable for sensing a muscle tone in a~~  
~~pectoral region of the patient,~~ and

the second sensor configured to detect ~~a second condition associated with a~~  
sleep-wake status of the patient;

a classification system coupled to the detector system and configured to classify ~~one~~  
~~or more sleep states~~ sleep state based on the REM sleep status and the sleep-  
wake status~~at least one of the first and second conditions;~~ and

a therapy system coupled to the classification system and configured to provide  
cardiac therapy based on sleep state classification.

105. (Previously presented) The device of claim 104, wherein the first sensor is an electromyogram sensor.

106. (Currently amended) The device of claim 104, wherein the cardiac rhythm management device comprises ~~further comprising~~:

a housing adapted for implantation in the pectoral region of the patient;

wherein the first sensor is mechanically coupled to the housing.

107. (Previously presented) The device of claim 106, wherein the classification system is disposed within the housing.

108. (Withdrawn) The device of claim 106, wherein the first sensor is positioned on the housing.

109. (Previously presented) The device of claim 106, further comprising a header mounted on the housing, and the first sensor is positioned on the header.

110. (Withdrawn – currently amended) The device of claim 104, ~~further comprising:~~  
wherein the cardiac rhythm management device comprises a housing adapted for  
implantation in the pectoral region of the patient; and  
a lead coupled to the housing;  
wherein the first sensor is disposed on the lead.

111. (Canceled)

112. (Previously presented) The device of claim 104, wherein the second sensor includes an accelerometer.

113. (Previously presented) The device of claim 104, wherein the second sensor includes a body posture detector.

114. (Currently amended) The device of claim 104, wherein the ~~first~~ second sensor is configured to detect a patient activity signal, and wherein the classification system is configured to determine sleep onset by comparing the patient activity signal to a sleep threshold.

115. (Previously presented) The device of claim 114, wherein the classification system is also configured to determine sleep offset by comparing the patient activity signal to the sleep threshold.

116. (Currently amended) The device of claim 104, ~~wherein the first sensor is configured to detect an REM-modulated signal, and~~ wherein the classification system is configured to determine REM sleep onset by comparing the ~~REM-modulated signal~~ pectoral muscle tone to an REM sleep threshold.

117. (Currently amended) The device of claim 116, wherein the classification system is also configured to determine REM sleep offset by comparing the pectoral muscle tone~~REM-modulated signal~~ to the REM sleep threshold.

118. (Previously presented) The device of claim 104, wherein the detector system further includes a third sensor configured to detect a cardiac signal, and wherein the therapy system is configured to provide bradycardia pacing therapy responsive to the detected cardiac signal and to the sleep state classification.

119. (Previously presented) The device of claim 118, wherein the bradycardia pacing therapy is adapted to switch to a lower pacing rate based on the sleep state classification.

120. (Withdrawn) The device of claim 104, wherein the detector system further includes a third sensor configured to detect a cardiac signal, and wherein the therapy system is configured to provide preventative arrhythmia therapy responsive to the detected cardiac signal and to the sleep state classification.

121. (Previously presented) The device of claim 104, wherein the detector system further includes a third sensor configured to detect a cardiac signal, the device further comprising:  
an analyzer configured to analyze the cardiac signal on a beat-to-beat basis;  
wherein the therapy system is configured to provide therapy based on both the sleep state classification and the beat-to-beat cardiac signal analysis.

122. (Previously presented) The device of claim 104, wherein the detector system further includes a third detector configured to detect a tidal volume of the patient's respiration, and wherein the therapy system is configured to declare a hypopnea event if the tidal volume falls below a hypopnea threshold.

123. (Previously presented) The device of claim 122, wherein the therapy system is also configured to declare an apnea event if the tidal volume falls below an apnea threshold lower than the hypopnea threshold.